

OCTOPUS RAPANUI, NEW SPECIES, FROM EASTER
ISLAND (CEPHALOPODA: OCTOPODA)

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Abstract.—*Octopus rapanui*, new species, is described from Easter Island. It is distinguished from other Indo-Pacific species by a combination of characters including the shape of the lower mandibular rostrum, long rachidian radular teeth, large secondary diverticulum of the penis and long, slender posterior salivary glands.

In 1977 I received a small octopus for identification, collected at Easter Island by B. Alarcon and sent to me by Harald A. Rehder, Smithsonian Institution. The specimen was immature and in poor condition, but the beaks and radula were different from others I have examined from the Pacific. A search through the collections at the Rosenstiel School of Marine and Atmospheric Science, University of Miami, brought to light eight more specimens, some sexually mature but all in poor condition. These specimens were collected by Ian E. Efford and Jack Mathias, University of British Columbia, on the Medical Expedition to Easter Island. Examination of all of the specimens convinced me that they represent a new and undescribed species. A survey of the cephalopod literature has revealed no record of an octopod from Easter Island although the islands were visited by several of the major expeditions of the 18th and 19th centuries. Thus this species represents the first octopod to be included in the faunal reports of Easter Island.

Octopus rapanui, new species

Figs. 1, 2

Holotype.—Male, mantle length 115 mm, F82, rotenone at Hanga Piko, Easter Island, Efford and Mathias, leg., 14 January 1965, USNM 729860.

Paratypes.—2 males, mantle lengths 97-113 mm, 1 female, mantle length 69 mm, F82, rotenone at Hanga Piko, Easter Island, Efford and Mathias, leg., 14 January 1965, USNM 729990.—1 female, mantle length 90 mm, M12, Apina Iti, Easter Island, Efford and Mathias, leg., 18 January 1965, UMML 1746.—1 male, mantle length 70 mm, 1 female, mantle length 107 mm, "collected in about 12 feet of water. Bottom rocky; in a sheltered cove. Caught at about 4:30 p.m." Vinapu, Easter Island, Efford and Mathias, leg., 25 January 1965, UMML 1742.—1 male, mantle length 88 mm, rotenone in subtidal pool near camp at Hanga Roa, Easter Island, Efford and Mathias

leg., 5 February 1965, UMML 1743.—1 female (?), mantle length 27 mm, Sta. E-37, in tide pool, B. Alarcon leg., Hanga Piko, Easter Island, 2 November 1974, USNM 751587.

Description.—The mantle is somewhat cylindrical and rather narrow except in one specimen (MWI males 41–49.8–74; females 51–56.8–63); the head is set off from the mantle by a slight constriction. The head is narrow (HWI males 29–37.6–49; females 38–44.8–52) and bears small eyes. The mantle aperture is wide.

The funnel is large, free for about half of its length. The funnel organ is indistinct but appears to be W shaped with the outer limbs a little longer than the median ones.

The arms are long (MAI males 13–23.4–27; females 22–24.0–28; ALI males 75–80.6–96; females 76–78.5–80), stout basally but tapering to long slender tips. The arm order is usually I.II.III.IV, but is somewhat variable, although I is almost always the longest and IV the shortest. In the females I is always the longest but in the males I was longest in two, II longest in three. The suckers are biserial and moderately large (SIn males 9–10.2–11; females 9–11.3–15). There are no specially enlarged suckers in the males.

The third right arm of the male is hectocotylyzed. It is shorter than the third left arm (HAI 72–84–95) and has a conspicuous spermatophoral groove. The ligula is small (LLI 1.4–2.8–4.0), medially excavated with thickened margins. The calamus is small but distinct (CLI 28.5–32.1–33.3). An interesting and possibly distinctive feature is best shown in the holotype. The spermatophoral groove at the base of the calamus widens and deepens into a pocket-like depression. It is visible but less distinct in other males of the species. The male with a mantle length of 88 mm had lost the major part of its hectocotylyzed arm but a new ligula had been produced that measured 1.8 mm complete with a calamus.

The web order cannot be ascertained if there is one, for it is extremely variable. The web is rather low but it extends up the ventral side of the arms to near the distal third or further (WDI males 19–21.2–22; females 18–19.8–22).

The gills bear 11 to 12 lamellae on the outer demibranch.

The digestive tract was dissected out. It shows many unusual features. The buccal mass is more elongate than in the typical *Octopus*. The upper beaks are normal but the lower beaks have a nearly straight rostrum that projects forward like a spine. The radula is normal except for the very long and slender rachidian teeth. The rachidian shows a B_{4-7} asymmetry. In the smallest specimen of 27 mm mantle length the rachidians are very long and slender with a possibility of three cusps on one side and two on the other. In the male of 88 mm mantle length the rachidians are somewhat shorter and broader with two to three cusps on one side with a B_7 order, while

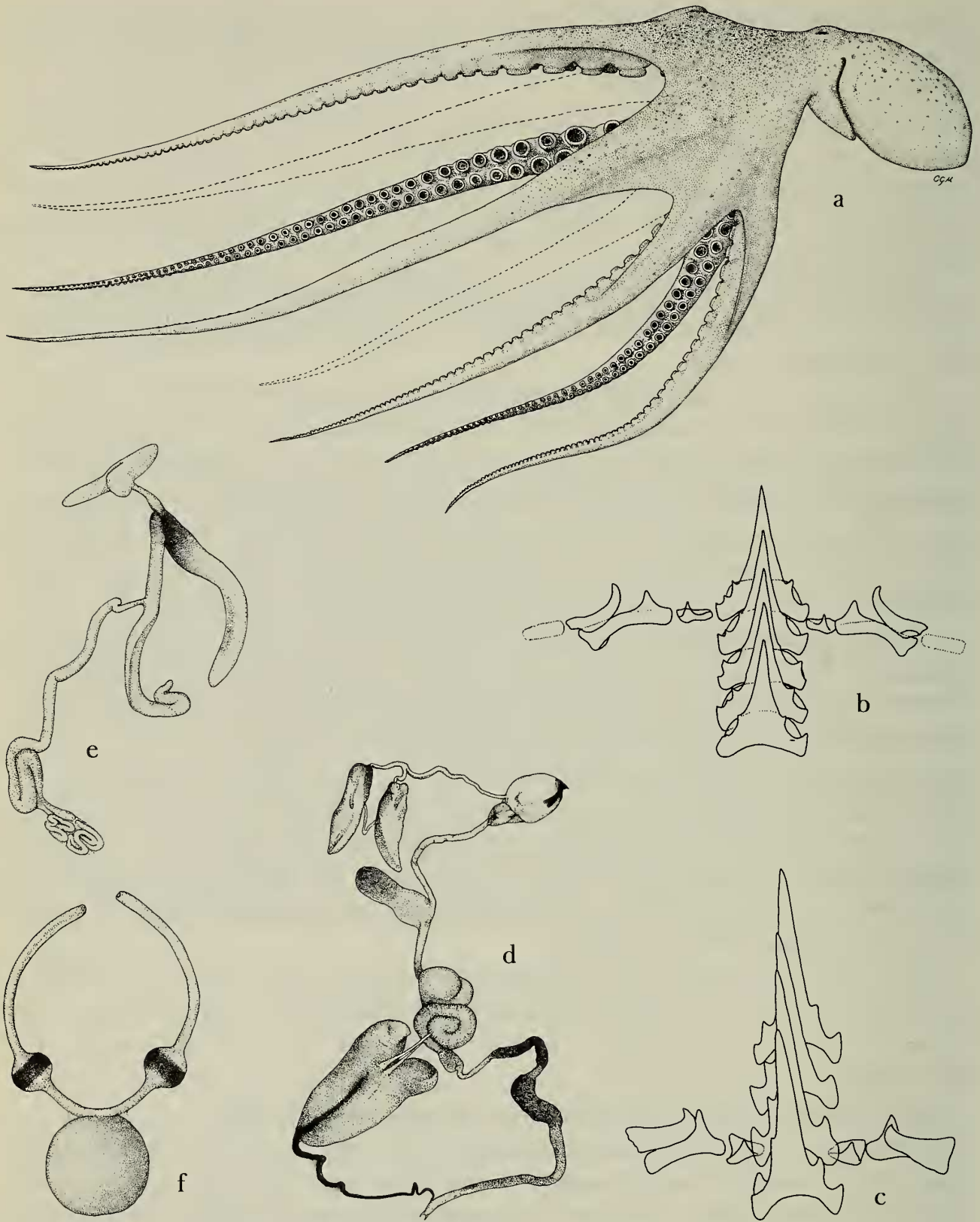


Fig. 1. *Octopus rapanui*: a, Lateral view of male, mantle length 88 mm; b, Radula of female, mantle length 107 mm; c, Radula of juvenile female (?), mantle length 27 mm; d, Digestive tract from female, mantle length 90 mm; e, Genitalia from male, holotype; f, Genitalia from female, mantle length 90 mm.

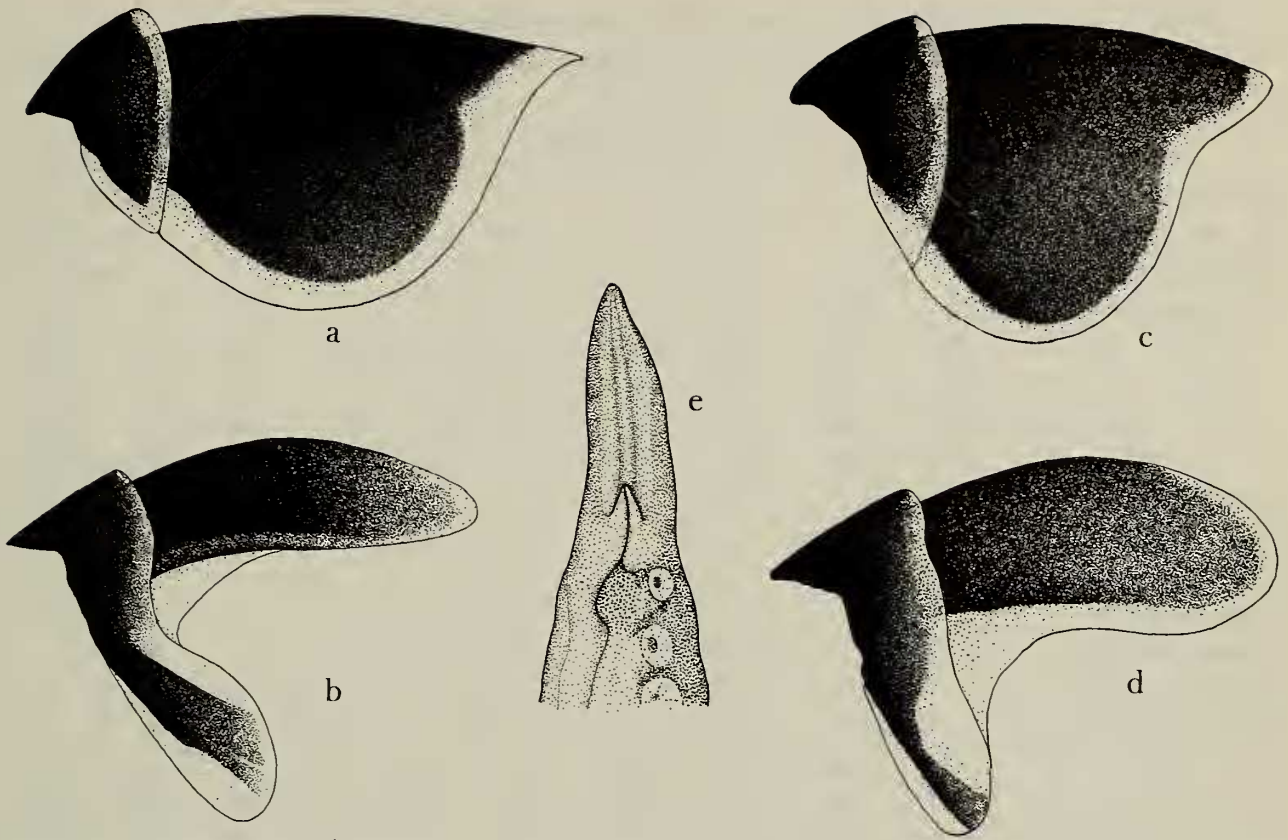


Fig. 2. *Octopus rapanui*: a–b, Upper and lower mandibles of female, mantle length 107 mm; c–d, Upper and lower mandibles of male, mantle length 70 mm; e, Hectocotylus of holotype.

there are only two cusps on the other side with a B_{4-5} order. In both specimens the third laterals are hooked at the tip. Both have marginal plates, those of the smaller poorly formed and indistinct.

The anterior salivary glands are large, somewhat free from the buccal mass and closely embrace the esophagus. In the 88 mm length male these glands are darkened, leaflike, and curled away from the esophagus. The second or posterior salivary glands have exceptionally long and stout ducts. The glands themselves are long, stout anteriorly and taper posteriorly. They are very large. The esophagus is long and in its posterior third enters the crop which is composed almost in its entirety of an exceptionally large caecum free for about $\frac{4}{5}$ of its length.

The short posterior esophagus leads into the typical bipartite stomach. The spiral caecum is large and strongly coiled. The digestive ducts lie singularly close together and lead into the strongly bilobed digestive gland near the midline. The digestive gland is long and tubular. There are no surface indications of the digestive duct appendages which may, however, be buried.

The intestine is exceptionally long and tripartite. The anus bears two slender anal flaps. The ink sac is long, runs the length of the digestive gland

Table 1. Measurements (in mm) and counts of 5 males of *Octopus rapanui*.

	Paratypes								Holotype	
	L		R		L		R		L	R
Mantle length	70		88		97		113		115	
Mantle width	32		65		45		47		47	
Head width	27		43		32		43		33	
Arm length										
I	262	235	379	71+	296	301	360	156	275	354
II	246	206	370	359	290	368	353	373	418	272
III	218	208	328	75+	322	231	278	240	210	279
IV	170	186	332	303	281	276	217	313	209	374
Total length	336		393		475		500		550	
Arm width	11		22		12		14		14	
Hect. Arm length	208		75+		231		240		279	
Ligula length	3		1.8		9		7		9	
Calmus length	1		0.45		3		2		3	
Sucker diameter	7		9		11		12		10	
Web depth	43		48.5		40		71		83	
	30	50	61	58	58	78	84	61	77	73
	51	49	82	48	80	58	70	58	80	66
	31	41	76	53	38	62	50	60	78	32
	23		51		78		60		72	
Gill lamellae	11		12		12		12		12	

and is deeply set into it. The free duct is very long, strongly convoluted at the proximal end, then straight, but looped several times at the distal end. It enters the intestine just proximal to the anus.

The female genitalia consist of a large round posterior ovary with paired oviducts and glands. The proximal oviducts are short and narrow. The oviducal glands are spherical with a dark band around the middle. The distal oviducts are long and a little stouter than the proximal ones. No mature eggs were seen.

The male genitalia were dissected out of two specimens. The penis is stout with a long penial diverticulum and a short stout supplementary diverticulum at the midpoint at the juncture with the duct from Needham's sac (PLI 20–29). Needham's sac is rather small but with a long accessory gland.

Two of the males had spermatophores. These were long (SpLI 66–75), slender, with large sperm reservoirs (SpRI 42.3–43.4). There were no unusual morphological features.

The specimens were all in a poor state of preservation and little can be told concerning their original coloration. They appear to be somewhat flesh-colored ventrally with a darker purplish cast dorsally. The dorsal and lateral surfaces of the mantle, head and arms are covered with scattered but prom-

Table 2. Measurements (in mm) and counts of 4 females of *Octopus rapanui*.

		Paratypes							
Mantle length		27		69		90		107	
Mantle width		17		35		54		57	
Head width		14		28		43		41	
Arm length		L	R	L	R	L	R	L	R
	I	115	86	310	156	394	364	387	383
	II	104	111	291	296	389	321	321	370
	III	99	86	264	271	380	271	193	381
	IV	93	97	226	234	336	349	335	331
Total length		144		387		500		508	
Arm width		6		9		14		16	
Sucker diameter		4		7		10		10	
Web depth									
sector A		17		49		69		68	
B		23	21	57	47	68	69	38	29
C		19	25	53	34	55	57	67	64
D		16	22	51	34	81	40	60	58
E		19		34		33		68	
Gill lamellae		11		11		11		12	

inent tubercles. Some of the tubercles over the eyes are somewhat larger than the others but not sufficiently so as to be called cirri.

Type Locality.—Hanga Piko, Easter Island.

Etymology.—This octopus is named for Easter Island which in the native language is called Rapa Nui. The specific name is, therefore, a noun in apposition.

Discussion.—*Octopus rapanui* is unusual in a number of aspects and shows no close relationship with any of the other species of the genus in the Indo-Pacific. While it might be grouped with those species having long first arms such as *Octopus macropus* and *O. ornatus*, it differs in so many other features that this relationship cannot be seriously considered. One of the distinctive features is the secondary diverticulum of the penis. This is unusual in the octopods and is not known in other species of *Octopus* sensu stricto. Most of the other distinguishing characters are associated with the digestive tract. The straight spine-like rostrum of the lower beak is known so far only in *Pareledone polymorpha* (Robson, 1930) in which this feature is even more accentuated. Associated with this is the very long rachidian teeth of the radula which are longer (in the young specimen) than in any other known octopod. These two features suggest a specialized diet, perhaps barnacles or some type of bivalve. There are no indications of food in any of the stomachs or crops investigated. Other specialized features are the very long, slender but large second salivary glands, the comparatively enormous crop, elongate digestive gland, and the long tripartite intestine.

Table 3. Indices of bodily proportions, formulas and counts of 5 males of *Octopus rapanui*.

					Holotype
Mantle length	70	88	97	113	115
Mantle width index	46	74	46	42	41
Head width index	39	49	33	38	29
Mantle arm index	27	23	26	13	28
Arm length index	79	96	77	75	76
Arm width index	16	25	12	12	12
Web depth index	19	22	22	23	20
Sucker index normal	10	10	11	11	9
Hect. arm index	95	—	72	85	41
Ligula length index	1.4	—	4.0	2.9	3.0
Calamus length index	33.3	—	33.3	28.5	33.3
Penis length index	20	—	29	22	27
Sperm. length index	—	—	—	75	66
Sperm. width index	—	—	—	2.3	2.6
Sperm. reservoir index	—	—	—	42.3	43.4
Arm formula	I.II.III.IV	I.II.III.IV	II.I.III.IV	II.I.III.IV	II.I.IV.III
Web formula	CBDAE	CBBEA	CBDA	BACDE	ACBDE
Gill lamellae	11	12	12	12	12

Table 4. Indices of bodily proportions, formulas and counts of 4 females of *Octopus rapanui*.

Mantle length	27	69	90	107
Mantle width index	63	51	60	53
Head width index	52	41	48	38
Mantle arm index	23	22	23	28
Arm length index	80	80	78	76
Arm width index	22	13	15	15
Web depth index	22	18	21	18
Sucker index normal	15	10	11	9
Arm formula	I.II.III.IV	I.II.III.IV	I.II.III.IV	I.II.III.IV
Web formula	BCDEA	BCDAE	DA = BCE	A = BCDE
Gill lamellae	11	11	11	12

Easter Island is a high island with steep-to shores where competition for food is probably intense; hence an adaptation to a favorable food niche would be more valuable and perhaps reinforced than in the more widespread coral reef habitats of the other areas of the tropical Pacific.

While this species appears to be distinct, the description of any new species of *Octopus* from the Pacific must be approached with caution. External characters would not have sufficed to distinguish this species from others, but it should also be noted that we know little of the internal anatomy of Pacific octopods in general, and it is possible that future work may show this combination of characters in another named species. Until then it seems best to regard *O. rapanui* as a new and distinctive member of the Indo-Pacific octopod fauna.

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